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Author: A. Labutin
K. Monakhova

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PROTECTION AGAINST SEA CORROSION BY LIQUID NAIRITS

The protection of metal equipment against sea corrosion is being done lately by new means which are made on the basis of special chloropene rubber called liquid nairits. These new materials are used for coating ship, port, and other equipment in the same method as painting; this method however, is more advanced in comparison with gluing of rubber sheets and could be used at any enterprise. The All Union-Scientific Research Institute for Synthetic Rubber, which was named after Academician S. V. Lebedev (VNIISK) developed three types of liquid nairits which are black in color; two of these compositions are required for the making of ready-made covers for heat vulcanization.

Compositions which are made on the basis of the NT nairit could be used without heating because they provide cover which hardens at normal temperature. Covers which are vulcanized by heating the air have the natural qualities of rubber and possess, first of all, high elasticity and good resistance to abrasion wear. They could be used in contact with the sea water as well as with solutions of acids, salts, and alkalines, which have a temperature not more than 70°. Covers which are made of the NT nairit and which have hardened in cold temperatures, i.e., those which have not undergone thermal processing, do not possess qualities which are similar to rubber. They are thermoplastic and become soft at temperatures which exceed 50°; in their anticorrosion qualities they do not differ from covers which are vulcanized with heat.

In order to create a reliable anticorrosion protection coating, the liquid nairit should not be applied directly to the clean metal, but over a water resistant prime coat which possesses high adhesive qualities.

The nairit coat is applied to a chloronairit base; it protects reliably steel and other metals against the corroding action, not only of sea water, but also of sulfuric acid, as well as against many other aggressive elements. Besides the resisting action against solutions of various electrolites, nairit covers are entirely satisfactory under usual temperatures against the action of gasoline, mineral oils, and grease.

The process of rubberizing with liquid nairit is not complicated. The coat could be applied with the help of bristle brush and even with paint sprayer. One application with the brush will produce a layer which is 0.2-0.3 mm thick.

In painting ship equipment, is is recommended that the nairit coat be not less than 1 mm thick; therefore, for 1 m^2 of metal surface, about 2.5-3 kg gumming composition will be used and 150-200 g chloronairit base.

In order to protect the equipment simultaneously against corrosion and errosion, the coat could be increased to 3 mm; if the thickness is increased, the formation of pores is possible and therefore a weakening of adhesion will take place as a result of the settling process.

Vulcanization of the cover is provided by heating the painted unit in a dryer at 100° temperature for one day (24 hours). In the rubber coating equipment with liquid nairites, it is necessary to observe all the technological rules of safety which have been established for working with paints and varnishes that contain flammable and toxid solvents.

The nairit cover should be equally distributed and smooth, should not have any pores, bubbles, beading, traces of the brush, and other outside defects.

The nonpermeability of the coat on metal equipment could be tested by electrical, chemical, or electrochemical methods. The YeD-5 type defectoscope could be utilized as electric defectoscope; it should not however, be used with voltage which exceed 700 volts per 1 mm thickness of dry nairit coating. When some pores are discovered in the coating, which has been applied to a carbonized steel by chemical methods, a 5% sopper sulfate solution could be used as a reagent; this solution should be made acid (by treatment with several drops of sulfurous acid).

The high operational qualities of the new coating were proven during the experimental work conducted on production projects. Liquid nairit was tested as an anticorrosion coating material for the protection of the steel covers of shipboard oil coolant units of the M017-1 type; the tests were made in the course of experimentation which involved changing the conventional covers made of copper alloys. After heat vulcanization, rubber coating covers were subjected to further testing on the whaling ships of the SLAVA flotilla. The oil coolant units with gummed covers were continuously used for more than 200 days in the course of which the ships spent 160 days in the Antarctia, 20 days in the tropics, and 20-30 days in moderate climate regions.

The experiments in using gummed steel covers showed that it is both possible and expedient to test them on a much wider scale under production conditions.

The experimental works conducted jointly with the Central Design Bureau for Equipment Construction showed that the liquid nairit could also be used successfully as anticorrosicn protection of some locking equipment which is made of ferrous metals. Equipment and fittings which have been rubberized with nairit through the hot vulcanization method, could be used at temperatures of up to 70° in contact with such aggressive liquids as a diluted (~ 65%) sulfuric acid, alkali solutions, mineral salts, etc.

The organization of industrial production of values, bolts, and other shutting-off devices rubberized with liquid nairit will produce a saving of metals and alloys.

Experimental work on the protection of the screw propellers by vulcanized coating on the basis of liquid nairits which is being conducted at the Klaypeda Ship Yard are of great interest. It was established that in spite of the fact that the rubber coating was worn out at the sharp edges of the propellers, when such were used in the operation of fishing trawlers, the

period of use of these propellers was nevertheless increased about two times and the speed of the ships, with rubberized screw propellers, did not decrease at all.

Rubber based compounds, which harden without heating, have very great promise in connection with sea and atmospheric corrosion, because with them one can protect objects of any size. It was established that liquid nairits could be used not only for providing anticorrosion coating, but for other types of coating such as sealing, fire proofing, sound proofing, electric insullation, etc.

The Central Scientific-Research Institute for Technology and Shipbuilding in conjunction with the All Union Scientific Research Institute for Synthetic Rubber finished its work in rubberizing with liquid nairites steel nonspark instruments which are used in tankers and in buildings where there might be danger of explosions.

After a thorough testing it was recognized that the rubberized instrument with oil-gasoline resistant nairits satisfies all the requirements which are set forth for a nonspark instrument. As a result of this work, a trade standard ON-9 was published which was entitled: "Instruments and Nonspark Accessories for Tankers."

From experimental work and from the information which is avilable in the literature on the subject, it is obvious that the liquid nairits which are being produced by the domestic industry will be able to find wide and diverse application in the fleet.
